MASONRY TECHNOLOGY

Program of Studies
2015-2016

Office of Career and Technical Education
Kentucky Department of Education
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Masonry Technology

Course Title	Post-Secondary Connection	Valid Course Code	Recommended Grade Level				Recommended Credit
			9	10	11	12	
Advanced Masonry	MSY 205	460113		X	X	X	1
Anchors and Reinforcement	MSY 245	460117		X	X	X	1
Basic Blocklaying	MSY 104	460110		X	X	X	1
Basic Bricklaying	MSY 103	460109		X	X	X	1
Basic Blueprint Reading	BRX 120	499920	X	X	X	X	.5
Concrete Finishing	MSY 251	460119		X	X	X	1
Co-op (Masonry)	MSY 199	460180			X	X	1
Fireplace Construction	MSY 275	460118		X	X	X	1
Industrial Safety	ISX 100	499930	X	X	X	X	.5
Intermediate Masonry	MSY 115	460116		X	X	X	1
Internship (Masonry)	MSY 198	460183			X	X	1
Introductory Masonry	MSY 105	460112	X	X	X	X	1
Residential Maintenance Masonry	NA	460114		X	X	X	1
Special Problems (Masonry)	MSY 291	460179		X	X	X	1

MASONRY TECHNOLOGY

Program Description

The Masonry Technology Program is designed to prepare students to be successful in obtaining an entry level position in the Masonry Industry, Apprenticeship Programs, or advanced post-secondary education. Residential and commercial construction applications are taught. The Program includes instruction in industrial safety, brick laying, block laying, stone and tile laying, site lay-out procedures, construction print reading, and concrete finishing as well as other skills preparing students to be productive upon graduation.

Units of instruction are designed to include lecture, and practical experience in the lab and on site projects. The experience gained through the lab setting gives students a better understanding of how residential and commercial buildings are constructed. Students in the Program are given the opportunity to actively and physically construct masonry walls and projects as well as form, place, and finish concrete.

Upon completion of the two year program students can enter the workforce as an apprentice mason, or mason tender. The Program is an excellent prerequisite for students who plan to enter apprenticeship programs and post-secondary education.

SAMPLE: CAREER PATHWAY- Masonry Construction

KENTUCKY CAREER PATHWAY/PROGRAM OF STUDY 2015-2016

COLLEGE/UNIVERSITY:	College / State University	**CLUSTER:**	Construction
	KCTCS Community College	**PATHWAY:**	Bricklayer Assistant / Mason Apprentice
HIGH SCHOOL (S):	KY ATC/CTC/High School	**PROGRAM:**	Masonry Technology

	GRADE	ENGLISH	MATH	SCIENCE	SOCIAL STUDIES	REQUIRED COURSES RECOMMENDED ELECTIVE COURSES OTHER ELECTIVE COURSES CAREER AND TECHNICAL EDUCATION COURSES			CREDENTIAL CERTIFICATE DIPLOMA DEGREE	SAMPLE OCCUPATIONS
SECONDARY	9	English I	Algebra I	Earth Space Science	World History	Health and PE	MSY 105 Introductory Masonry 46012	Industrial Safety 499930 & Basic Blue Print		
	10	English II	Geometry	Biology I	World Civics	History and Appreciation of Fine Arts	MSY 115 Intermediate Masonry 460116	MSY 245 Anchors & Reinforcement		
	11	English III	Algebra II	Physics or Chemistry	U.S. History	Foreign Language	MSY 205 Advanced Masonry 460113	MSY 251 Concrete Finishing	NCCER Masonry Level 1	Bricklayer Assistant
	12	English IV	Math Elective	Computer Aided Drafting (elective)	World Geography	MSY 275 Fireplace Construction	MSY 298 Internship (Masonry) 460183	MSY 299 Co-op 1 (Masonry) 460180	Industrial Certification	Masons Apprentice
POSTSECONDARY	Year 13	ENG 101 Writing I	MT 110 Applied Mathematics	ASTR 104 Astronomy	College Chemistry	PSY 100 Intro Psychology	MSY 235 Special Techniques in Brick Construction	Occupation Safety	Masonry Technician	Industry Apprenticeship
	Year 14	ENG 200 Intro/Literature	Math 200	WLD 221 Certification Lab	HIS 109 US History	MSY 255 Glass Block & Tiles	Materials Science	MSY 257 Stone	Associates Degree in Applied Science	Masonry Foreman / Manager
	Year 15	ENG 200 Intro/Literature	MAT 250 CALCULUS	PHY 236 UNIV. PHYSICS I	CIV 102 WORLD CIV. II	PHY 195 METHODS OF ENG. PHYSICS	CIV 102 WORLD CIV. II	CAD 200 Intermediate Computer Aided design		
	Year 16	PHY 140 INTRO. COMPUTING APPS.	MAT 308 CALCULUS II	PHY 259 STATICS	MAT 309 CALCULUS III	MAT 411 DIFFERENTIALS EQTNS.	TECHNICAL ELECTIVE	PHY 330 DYNAMICS		
	Year 17	PHY 344 FLUID MECHANICS	PHY 370 INTRO. MODERN PHYSICS	CHE 201 GEN. COLLEGE CHEM. I	HUM 211 HUMANITIES	ITD 102 CAD APPLICATIONS	PHY 346 HEAT TRANSFER	PHY 375 MATERIALS SCIENCE	PHY 390 ENGR. MEASUREMENT	TECH.ELECTIVE
	Year 17	PHY 359 MECHANICS OF MATERIALS	PHY 470 OPTICS	PHY 498 SENIOR ENGR. DESIGN I	ECO 231 PRINC. OF MICROECONOMICS	PHY 499 SENIOR ENGR. DESIGN II	TECHNICAL ELECTIVE	MAT DEPTH ELECTIVE	FREE ELECTIVE	HUM/FA ELEC.
								BACHELORS DEGREE ENGINEERING	Western Kentucky UNIVERSITY	ENGINEER

Other Elective Courses

Career and Technical Education Courses

Credit-Based Transition Programs (e.g. Dual/Concurrent Enrollment, Articulated Courses, 2+2+2)

(◆=High School to Comm. College) (● =Com. College to 4-Yr Institution) (■ = Opportunity to test out)

Mandatory Assessments, Advising, and Additional Preparation

TECHNICAL COLLEGE CREDIT GIVEN THROUGH THE KCTCS DUAL ENROLLMENT PROGRAM

Certificate given through the Warren County Area Technology Center

Degree given through the Bowling Green Technical College KCTCS

DEGREE GIVEN THROUGH THE MURRAY STATE UNIVERSITY

Funded by the U. S. Department of Education
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Revised Jan. 2005
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MASONRY TECHNOLOGY CAREER PATHWAYS
2015-2016

BRICKLAYER ASSISTANT
CIP 46.0101.01

PATHWAY DESCRIPTION: A program that prepares individuals to apply technical knowledge and skills in the laying and/or setting of exterior brick, concrete block, hard tile, marble and related materials, using trowels, levels, hammers, chisels, and other hand tools. Includes instruction in technical mathematics, blueprint reading, structural masonry, decorative masonry, foundations, reinforcement, mortar preparation, cutting and finishing, and applicable codes and standards.

BEST PRACTICE CORE	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) *Complete **(4) FOUR CREDITS:*** • 460112 Introductory Masonry • 460116 Intermediate Masonry • 460114 Residential Maintenance Masonry • 499930 Industrial Safety* AND 499920 Basic Blueprint Reading* • 460180 Co-op (Masonry) OR • 460183 Internship (Masonry) Note: (*) Indicates half-credit course	Bricklayer/Stonemason Concrete Mason Construction Laborer Construction Manager Construction Tradesperson

MASONRY TECHNOLOGY CAREER PATHWAYS
2015-2016

MASON APPRENTICE
CIP 46.0101.02

PATHWAY DESCRIPTION: A program that prepares individuals to apply technical knowledge and skills in the laying and/or setting of exterior brick, concrete block, hard tile, marble and related materials, using trowels, levels, hammers, chisels, and other hand tools. Includes instruction in technical mathematics, blueprint reading, structural masonry, decorative masonry, foundations, reinforcement, mortar preparation, cutting and finishing, and applicable codes and standards.

BEST PRACTICE CORE	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) *Complete **(4) FOUR OR MORE CREDITS:*** • 460112 Introductory Masonry • 460116 Intermediate Masonry • 460119 Concrete Finishing • 460180 Co-op (Masonry) OR 460183 Internship (Masonry) • 460113 Advanced Masonry • 460117 Anchors and Reinforcement	Bricklayer/Stonemason Concrete Mason Construction Laborer Construction Manager Construction Tradesperson

COMPLIMENTARY OR ADVANCED COURSEWORK BEYOND MASONRY TECHNOLOGY CAREER PATHWAY(S)
Upon completion of a pathway, additional coursework to enhance student learning is encouraged. Credits earned in Advanced or Complimentary Coursework "Beyond the Pathway" may not be substituted for pathway courses in order to achieve Preparatory or Completer status.
460109 Basic Bricklaying
460110 Basic Blocklaying
460118 Fireplace Construction
460179 Special Problems (Masonry)
Career Options
JAG Courses

Advanced Masonry

460113

Course Description		
The advanced course provides experience in laying quoin corners, bricking in around electrical and plumbing units, and laying door and window brick sills The student will construct expansion joints, piers, pilasters and retaining and split face block walls.		
Prerequisite: MSY 105		
Content/Process		
1	**Advanced Masonry:** a) Lay a quoin corner b) Construct obtuse angle brick corners c) Tooth a wall or corner d) Brick in electrical, plumbing, and air conditioning fixtures e) Lay door and window brick sills f) Clean walls with acid g) Determine elevations of foundation brick shelves h) Secure electrical, plumbing, and air conditioning fixtures, lines, and ducts in walls i) Lay block in a stack bond j) Construct expansion joints k) Construct piers l) Construct pilasters m) Construct a retaining wall n) Lay split face block walls	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS MSY 205
CTSO's – Skills USA

Course Description		
This course presents different types of reinforcement used in masonry units such as installing wall ties and reinforcing wire, tying intersecting walls with metal ties, installing masonry anchor bolts, setting and anchoring door and window frames, and setting steel lintels and bearing plates. Students will also install dovetail ties to concrete, set preformed masonry lintels, and lay paving brick in a herringbone pattern.		
Prerequisites: None		
Content/Process		
1	**Anchors and Reinforcement:** a) Install wall ties b) Install reinforcing wire c) Tie intersecting walls with metal ties d) Install anchor bolts e) Set and anchor door and window frames f) Set steel lintels g) Set preformed masonry lintels h) Build a reinforced block lintel in place i) Set bearing plates j) Install dovetail ties to concrete	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards *Post-Secondary: KCTCS MSY 245 CTSO's – Skills USA		

Basic Blocklaying

460110

Course Description		
Demonstrate the proper and safe use of masonry tools and the various types of mortar and cement while laying block on the job site. The students will perform the skills used in blocklaying procedures; mixing mortar, use of the trowel, spreading mortar, making head/bed joints, laying masonry units. Demonstrate the different methods of spacing materials, the 6-8-10 method, use of the transit level, block spacing, on laying straight, plumb block to the line, and the use of a modular rule. This course will also include 10 hours of safety training required to receive the OSHA 10 card.		
Content/Process		
1	**Basic Blocklaying:** a) Practice a safe work environment according to best practices in the masonry industry. b) Determining coursing using a modular rule. c) Proportion and mix mortars manually with a hoe and mortar box. d) Stock a mortar board or pan. e) Temper mortar. f) Chalk a line. g) Lay block to a line while holding bond. h) Layout building lines using the Pythagorean therum (6-8-10). i) Layout block corners and walls with tape measure. j) Square corners with a 2' framing square. k) Spread mortar for block. l) Butter head joints for block. m) Lay closure block. n) Plumb and level with mason's 2' and 4'levels. o) Finish block using a convex jointer.	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards CTSO's – Skills USA		

Course Description
Demonstrate the proper and safe use of masonry tools and the various types of mortar and cement while laying block on the job site. The students will perform the skills used in bricklaying procedures; mixing mortar, use of the trowel, spreading mortar, making head/bed joints, laying masonry units. Demonstrate the different methods of spacing materials, the 6-8-10 method, use of the transit level, brick spacing, on laying straight, plumb brick to the line, and the use of a modular rule. This course will also include 10 hours of safety training required to receive the OSHA 10 card.

Content/Process		
1	**Basic Bricklaying:** a) Demonstrate a safe work environment according to best practices in the masonry industry and OSHA standards. b) Determine coutsing using a modular/brick spacing rule. c) Carry brick with tongs. d) Dry bond brick. e) Proportion and mix mortars manually with a hoe and mortar box. f) Stock a mortar board or pan. g) Temper mortar. h) Spread mortar for brick. i) Butter head joints for brick. j) Lay brick to a line while holding bond. k) Lay closure brick. l) Chalk a line. m) Layout building lines using Pythagorean therum (6-8-10). n) Square corners with a 2' framing square. o) Finish joints with a variety of masonry tools. p) Plumb and level with mason's 2' and 4' levels.	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
CTSO's – Skills USA

Basic Blueprint Reading

499920

Course Description		
This course presents basic applied math, lines, multiview drawings, symbols, various schematics and diagrams, dimensioning techniques, sectional views, auxiliary views, threads and fasteners, and sketching typical to all shop drawings. Safety will be emphasized as an integral part of the course		
Content/Process		
1	**Basic Blueprint Reading:** a) Introduction and math review (fractions and decimals) b) Identify the alphabet of lines c) Identify multiple views d) Arrange multiple views e) Arrange two-view drawings f) Identify one-view drawings g) Arrange and identify auxiliary views h) Demonstrate the use of size and location dimensions i) Demonstrate proper dimensions of cylinders and arcs j) Size dimensions of holes and angles k) Locate dimensions for centering of holes, points, and centers l) Interpret the base line dimensions on drawings m) Identify half, full, and removed sections n) Identify electrical schematic and diagram symbols o) Identify welding symbols and equipment p) Interpret ordinate and tabular dimensions q) Set tolerances using geometric dimensioning techniques r) Sketch parts with irregular shapes s) Sketch oblique views of various parts t) Sketch and dimension shop drawings u) Dimension parts using shop notes v) Calculate tolerances w) Identify labeling of various screw threads x) Calculate tapers and machined surfaces y) Interpret connections and flow of various electrical, hydraulic, and pneumatic schematics and diagrams	
Connections: *Secretary's Commission on Achieving Necessary Skills (SCANS) *National Center for Construction Education Research (NCCER) *21st Century Skills *Common Core State Standards ELA and Math *Interdisciplinary Course		

Concrete Finishing

460109

Course Description
The focus of this course is the composition of concrete; define the advantages of air-entrained concrete, learn how concrete is tested for strength requirements, and the steps in preparing, placing, finishing, and curing concrete. The student shall be able to describe how floors, steps, footers, and pads are laid out and constructed, become familiar with construction safety practices and learn the safe and proper use of hand, portable and stationary power tools. In addition, students will develop a working knowledge of construction procedures utilized in residential and commercial construction.

Content/Process		
1	**Concrete Finishing:** a) Prepare wood and steel forms b) Prepare for pouring c) Install expansion joints d) Pour concrete e) Screed concrete f) Finish concrete by hand g) Finish concrete by machine h) Estimate cubic yards i) Pour concrete footers and pads j) Set grade stakes for footers k) Identify different types of concrete finishes l) Running a power screed m) Setting forms n) Sawing expansion joints o) Identify joint materials p) Adding color to concrete q) Concrete stamping r) Setting grade stakes s) Textured concrete t) Running a bull float u) Running a edger v) Using a finish trowel w) Concrete placement	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
CTSO's – Skills USA

Co-op

460180

Course Description		
Co-op I provides supervised on-the-job work experience related to the student's educational objectives. Students participating in the Cooperative Education program receive compensation for their work.		
Prerequisite: None		
Content/Process		
1	**Co-op:** a) Gain career awareness and the opportunity to test career choice(s) b) Receive work experience related to career interests prior to graduation c) Integrate classroom studies with work experience d) Receive exposure to facilities and equipment unavailable in a classroom setting e) Increase employability potential after graduation f) Earn funds to help finance education expenses	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards *Post-Secondary: KCTCS MSY 199 CTSO's – Skills USA		

Fireplace Construction

460118

Course Description		
This course presents different types and styles of indoor and outdoor fireplaces, and the principles of layout, drafting, and drawing a fireplace. Finishing dimensions of fireplace opening, firebox layout, setting the flue lining, and applying a chimney cap are also included.		
Prerequisite: MSY 205		
Content/Process		
1	**Fireplace Construction:** a) Lay out fireplaces b) Build ash pits with clean-out doors c) Enclose prefabricated fireboxes d) Install grills and ducts for prefabricated fireboxes e) Install fireplace inserts f) Lay brick with fireclay or high temperature mortar g) Construct firebox with ash dumps h) Install dampers i) Construct smoke chambers with smoke shelves j) Install flue liners k) Cut flue liners with hand tools l) Install thimbles m) Build chimneys n) Install roof flashing in joints and regrets o) Cap off chimney	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards *Post-Secondary: KCTCS MSY 275 CTSO's – Skills USA		

Industrial Safety

499930

Course Description		
This course provides practical training in industrial safety. The students are taught to observe general safety rules and regulations, to apply work site and shop safety rules, and to apply OSHA regulations. Students are expected to obtain certification in first aid and cardiopulmonary resuscitation.		
Prerequisites: None		
Content/Process		
1	**Industrial Safety:** a) Apply work site and lab safety procedures b) Apply personal safety rules and procedures c) Apply fire prevention rules and procedures d) Obtain first aid certification e) Obtain CPR certification (Recommended but not required) f) Demonstrate hazardous communications procedures g) Describe and demonstrate universal precautions procedures h) Obtain OSHA 10 certification (recommended but not required)	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards *Post-Secondary: KCTCS ISX 100 CTSO's – Skills USA		

Course Description		
Builds on proficiency in competencies learned in MASE 105. Focuses on laying straight and plumb brick to the line, emphasizing bricking gables and building columns. Laboratory.		
Content/Process		
1	**Intermediate Masonry:** a) Proportion and mix mortars manually with a hoe and mortar box b) Set up and maintain a mortar mixer c) Proportion and mix mortar with electric and gasoline powered mixers d) Set up and maintain masonry saws e) Stock a mortar board or pan f) Temper mortar g) Lay out building lines using the 6-8-10 method h) Determine coursing with a brick spacing rule and with a modular mason's rule i) Drop jack lines j) Set corner poles for veneer k) Plumb and level with a mason's two (2') and four (4') foot levels. l) Gauge-Plumb with a plumb bob m) Chalk a line n) Set lines, pins, block and trigs o) Inspect, assemble and disassemble rigging and scaffolding p) Carry brick with tongs q) Cut masonry materials with hand tools r) Cut materials with a masonry saw s) Identify brick types t) Spread mortar for brick u) Make head joints for brick v) Lay inside and outside brick corner leads w) Gauge masonry walls with a mason's modular rule x) Dry bond brick y) Bond a brick wall for range with a rule z) Lay brick to a line while holding bond aa) Tuck-point a wall bb) Finish joints with a variety of tools cc) Identify types of block dd) Lay out block corners and walls with a tape measure ee) Bond corners for all widths of block ff) Spread mortar for block gg) Lay inside and outside block corner leads hh) Lay a block wall to a line ii) Lay closure block/brick	

	jj) Bond corners for all widths of block kk) Install foundation vents ll) Top out veneer walls behind frieze boards mm) Brick a gable nn) Build brick columns	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS MASE 115
*CTSO's--SkillsUSA

Internship (Masonry)

460183

Course Description		
The Practicum provides supervised on-the-job work experience related to the student's educational objectives. Students participating in the Practicum do not receive compensation.		
Content/Process		
1	**Internship (Masonry):** a) Gain career awareness and the opportunity to test career choice(s) b) Receive work experience related to career interests prior to graduation c) Integrate classroom studies with work experience d) Receive exposure to facilities and equipment unavailable in a classroom setting e) Increase employability potential after graduation	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards *Post-Secondary: KCTCS MSY 198 CTSO's – Skills USA		

Course Description		
Introduce various types of mortar and cement along with the use of basic masonry tools. Emphasizes the different methods of spacing materials on a construction site, the 6-8-10 method, and use of the transit level, brick spacing, and modular rule. Focusing on laying straight and plumb brick to the line, bricking gables and building columns. Permits application techniques for setting up different types of masonry materials, marking off layout lines, and erecting batter boards along with techniques employed in different types of weather and climates. Laboratory.		
Content/Process		
1	**Introductory Masonry:** a) Proportion and mix mortars manually with a hoe and mortar box b) Set up and maintain a mortar mixer c) Proportion and mix mortar with electric and gasoline powered mixers d) Setup and maintain masonry saws e) Stock a mortar board or pan f) Temper mortar g) Lay out building lines using the 6-8-10 method h) Square corners with a framing square i) Determine coursing with a brick spacing rule and with a modular mason's rule j) Determine coursing with a modular mason's rule k) Drop jack lines l) Set corner poles for veneer m) Set freestanding corner poles n) Plumb and level with a mason's two (2') and four (4') foot levels o) Plumb with a plumb bob p) Chalk a line q) Set lines, pins, blocks, and trigs r) Inspect, assemble, and disassemble rigging and scaffolding s) Carry brick with tongs t) Cut masonry materials with hand tools u) Cut materials with a masonry saw v) Identify brick types w) Spread mortar for brick x) Make head joints for brick y) Lay inside and outside brick corner leads z) Gauge masonry walls with a mason's modular rule aa) Dry bond brick bb) Bond a brick wall for range with a rule cc) Lay brick to a line while holding bond dd) Tuck-point a wall ee) Finish joints with a variety of tools ff) Identify types of block gg) Lay out block corners and walls with a tape measure	

	hh) Bond corners for all widths of block ii) Spread mortar for block jj) Lay inside and outside block corner leads kk) Lay a block wall to a line ll) Lay closure block/brick mm) Lay 4" partition block walls, and cap block nn) Install foundation vents	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS MASE 105
*CTSO's--SkillsUSA

Residential Maintenance Masonry

460114

Course Description		
This course covers the basic aspects of masonry as it relates to the residential structure. Emphasis is placed on proper handling, mixing, placing, and finishing of Portland cement products.		
Content/Process		
1	**Residential Maintenance Masonry:** a) Practice safe masonry procedures b) Use masonry trowels, hammers, and chisels c) Proportion and mix concrete d) Install concrete e) Edge, joint, and finish concrete f) Measure and mix mortar with a hoe and mortar box g) Repair/replace bricks h) Repair/replace concrete blocks i) Tuckpoint walls j) Cut masonry materials with hand tools k) Cut masonry materials with a circular saw l) Clean and maintain masonry tools m) Estimate masonry materials n) Store masonry tools, materials, and equipment	
Connections: *Common Core State Standards *KOSSA *Common Core Technical Standards *New Generation Science Standards CTSO's – Skills USA		

Special Problems

460179

Course Description		
This course is designed for the student who has demonstrated specific special needs.		
Content/Process		
1	Selected tasks/problems as determined by the instructor	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
CTSO's – Skills USA